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(54) **ROTARY SCREW BLANCHER**

426/455, 457, 460, 507, 618–620;
134/132, 65; 100/117, 145; 366/234,
366/318

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See application file for complete search history.

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99/516, 536; 426/509, 524, 506, 508,

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,144,818 A * 8/1964 Sullivan F26B 17/18
100/117
3,722,401 A * 3/1973 Davidson A23N 12/00
134/105

(Continued)

FOREIGN PATENT DOCUMENTS

EP 0325807 8/1989

OTHER PUBLICATIONS

International Preliminary Report on Patentability, dated Mar. 25,
2014, The International Bureau of WIPO, Geneva, Switzerland.

(Continued)

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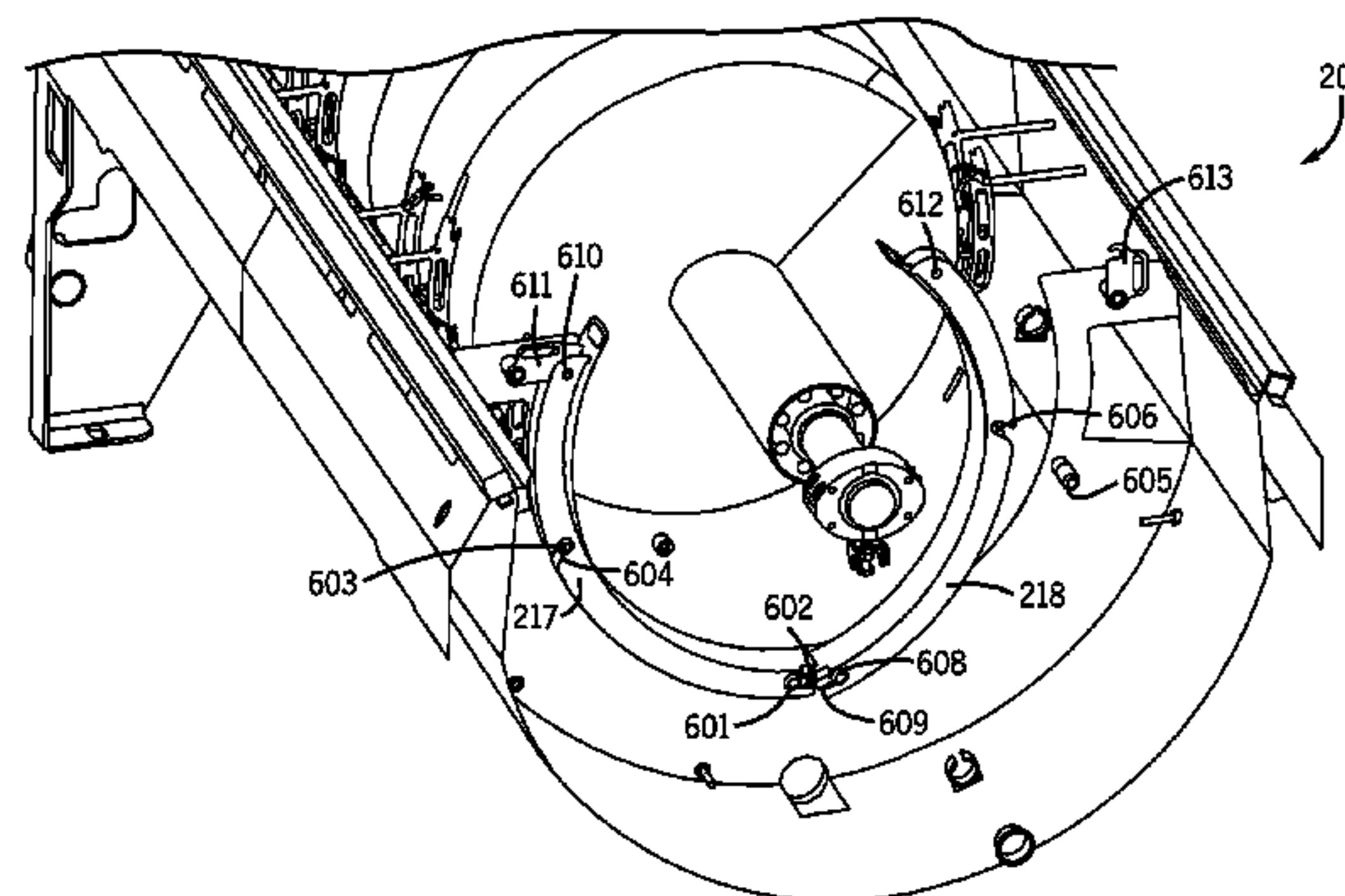
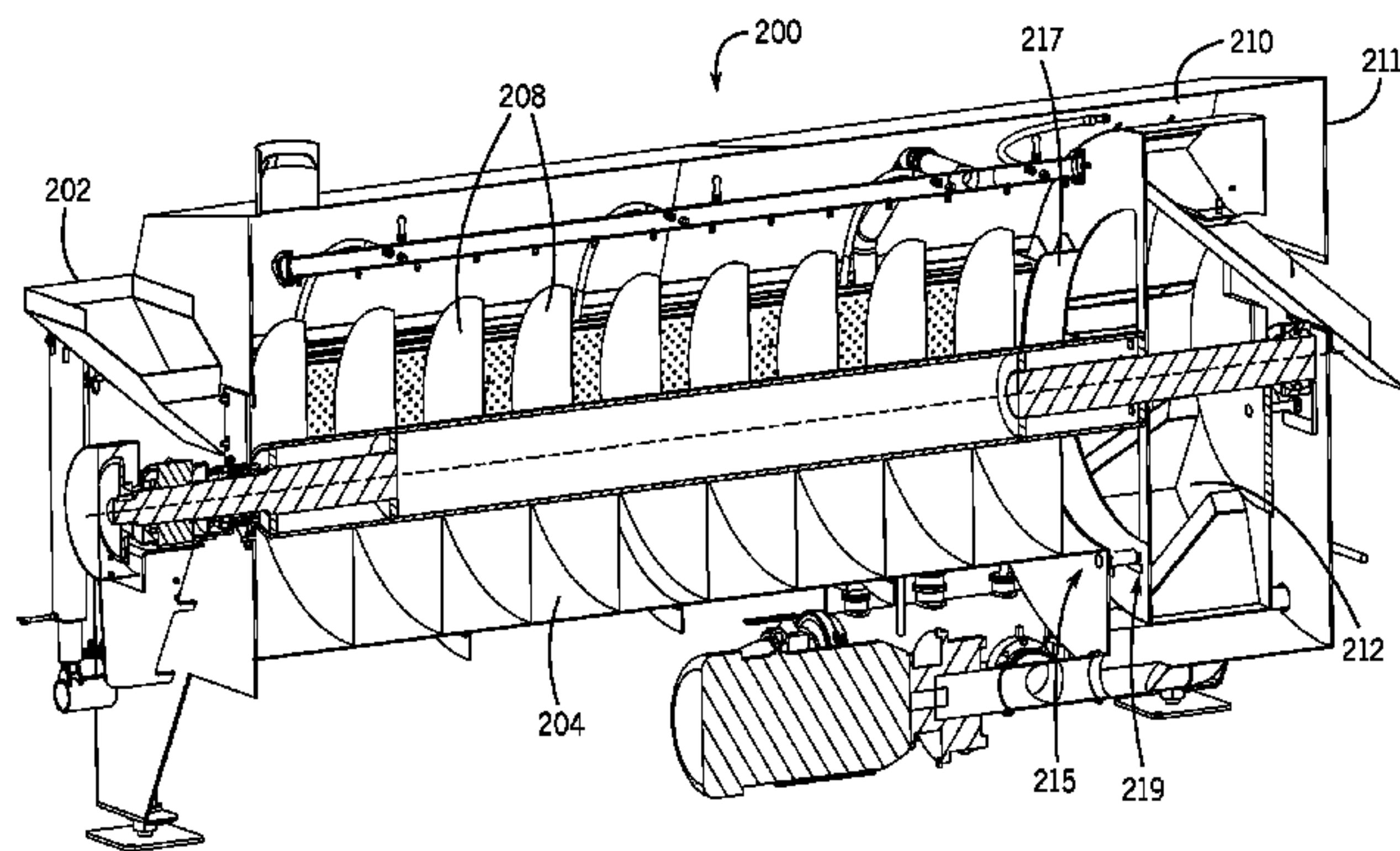
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(57) **ABSTRACT**

A food processing apparatus including a tank having an inlet
end for receiving food product and an outlet end for dis-
charging food product, the tank having a rotatable auger
mounted in a compartment, the auger for advancing food
product within the compartment from the inlet end toward
the outlet end, the auger including flights having a flight wall
with a radial edge, a clearance space being defined between
the radial edge of the flights and a solid, imperforate wall
portion of an inner wall. One of the inner wall and the flight
wall may include a perforated wall portion. A transition zone
includes a moveable surface to contain food product while
in use.

21 Claims, 6 Drawing Sheets



(56)

References Cited

U.S. PATENT DOCUMENTS

3,727,759 A * 4/1973 Stevens A01F 12/46
198/537
3,760,714 A * 9/1973 Lortz A23N 12/023
165/72
3,815,491 A * 6/1974 Guyer A23N 17/004
231/4
4,018,899 A * 4/1977 Seckler et al. 426/55
4,091,721 A * 5/1978 Cosmi A01J 25/12
426/36
4,117,776 A * 10/1978 Hunt B30B 9/18
100/117
4,237,782 A * 12/1980 Bichel A23N 7/02
134/132
4,253,946 A * 3/1981 Ludwig B02B 1/02
138/106
4,380,496 A * 4/1983 Maffet 210/780
5,085,137 A * 2/1992 Mottur et al. 99/404
5,137,740 A * 8/1992 Benson et al. 426/438
5,146,841 A 9/1992 Zittel
5,147,133 A * 9/1992 White B01F 13/0035
134/166 R
5,363,747 A * 11/1994 Clark et al. 99/348
5,427,015 A * 6/1995 Zittel 99/348
5,752,431 A * 5/1998 Zittel 99/348

5,780,088 A * 7/1998 Zittel A23N 12/023
426/481
5,802,961 A * 9/1998 Hay A23B 7/0053
165/111
5,972,413 A * 10/1999 Whitney A23L 7/196
426/455
6,105,485 A * 8/2000 Zittel 99/348
6,263,785 B1 * 7/2001 Zittel 99/348
6,419,094 B1 * 7/2002 Zittel et al. 210/393
6,776,087 B1 * 8/2004 Amstad 99/540
7,735,415 B2 * 6/2010 Zittel et al. 99/348
9,060,530 B2 * 6/2015 Stousland A23L 3/001
2005/0260311 A1 * 11/2005 Garwood A23B 4/16
426/480
2009/0022877 A1 * 1/2009 Sample 426/616
2010/0015311 A1 * 1/2010 Stousland A23L 3/001
426/509
2010/0043649 A1 * 2/2010 Maupin A23B 7/06
99/348
2010/0196565 A1 * 8/2010 Glascock et al. 426/310
2011/0072980 A1 3/2011 Maupin et al.

OTHER PUBLICATIONS

International Search Report and Written Opinion of the International Searching Authority, European Patent Office, dated Jan. 23, 2013, Rijswijk, Netherlands.

* cited by examiner

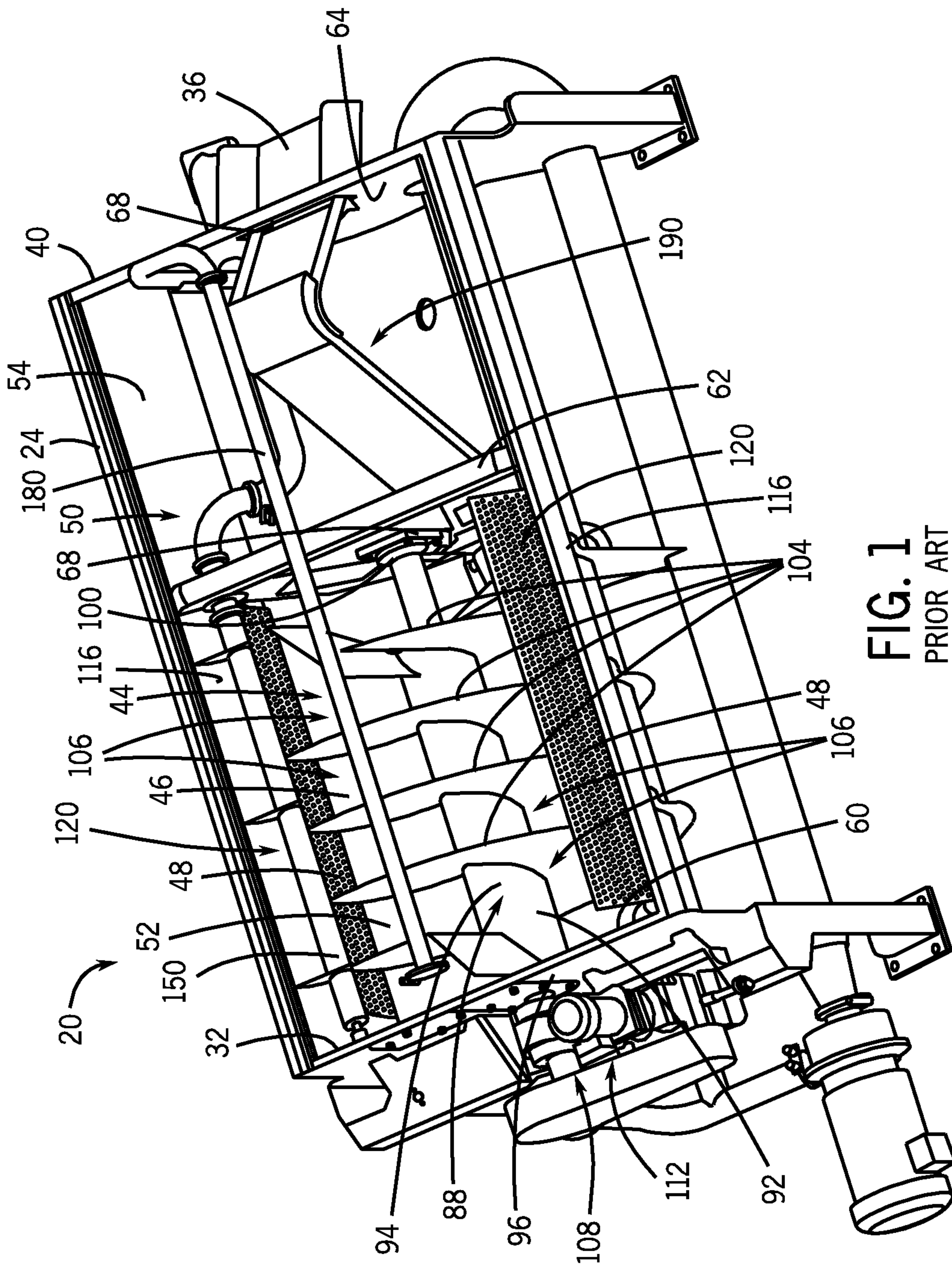


FIG. 1
PRIOR ART

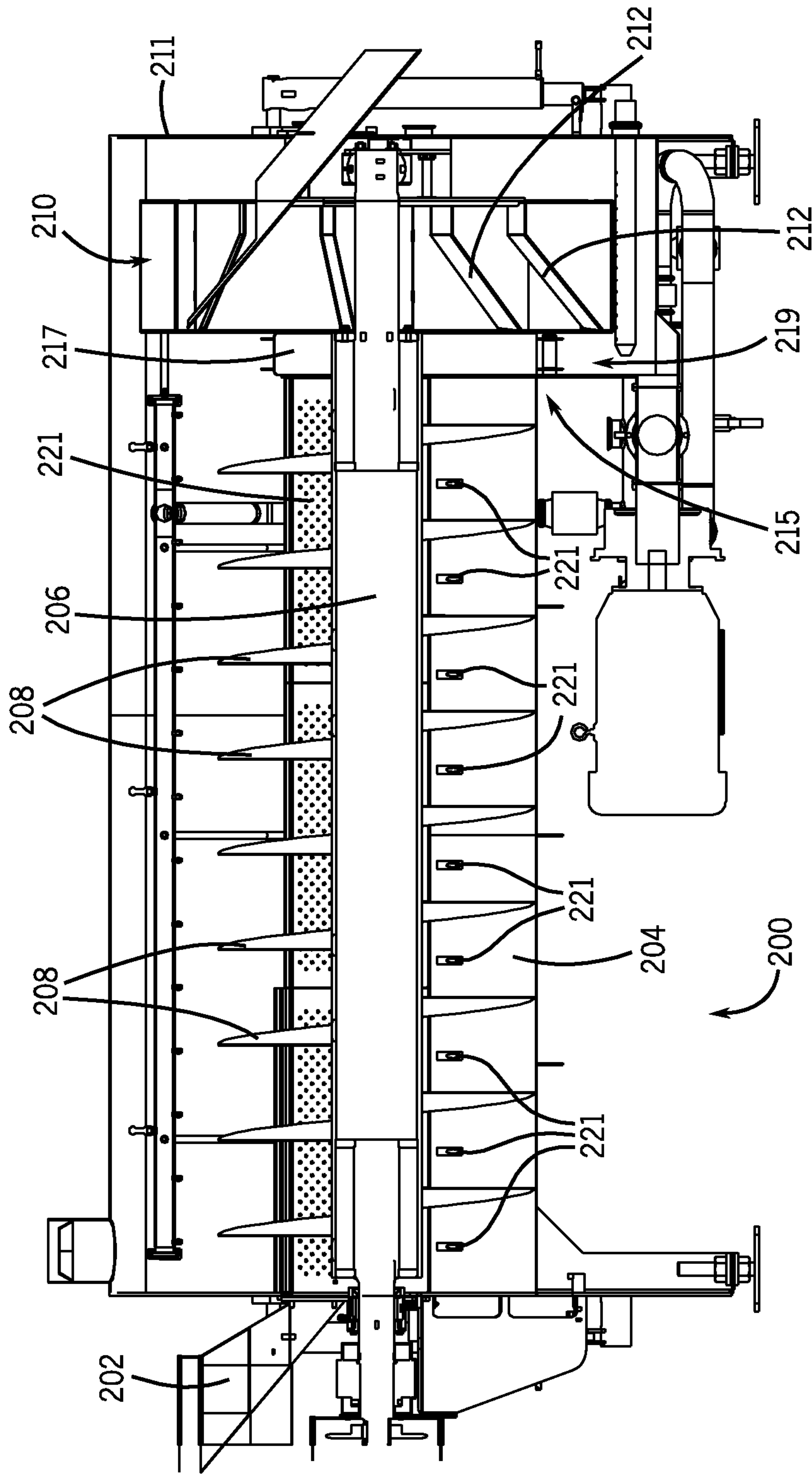


FIG. 2

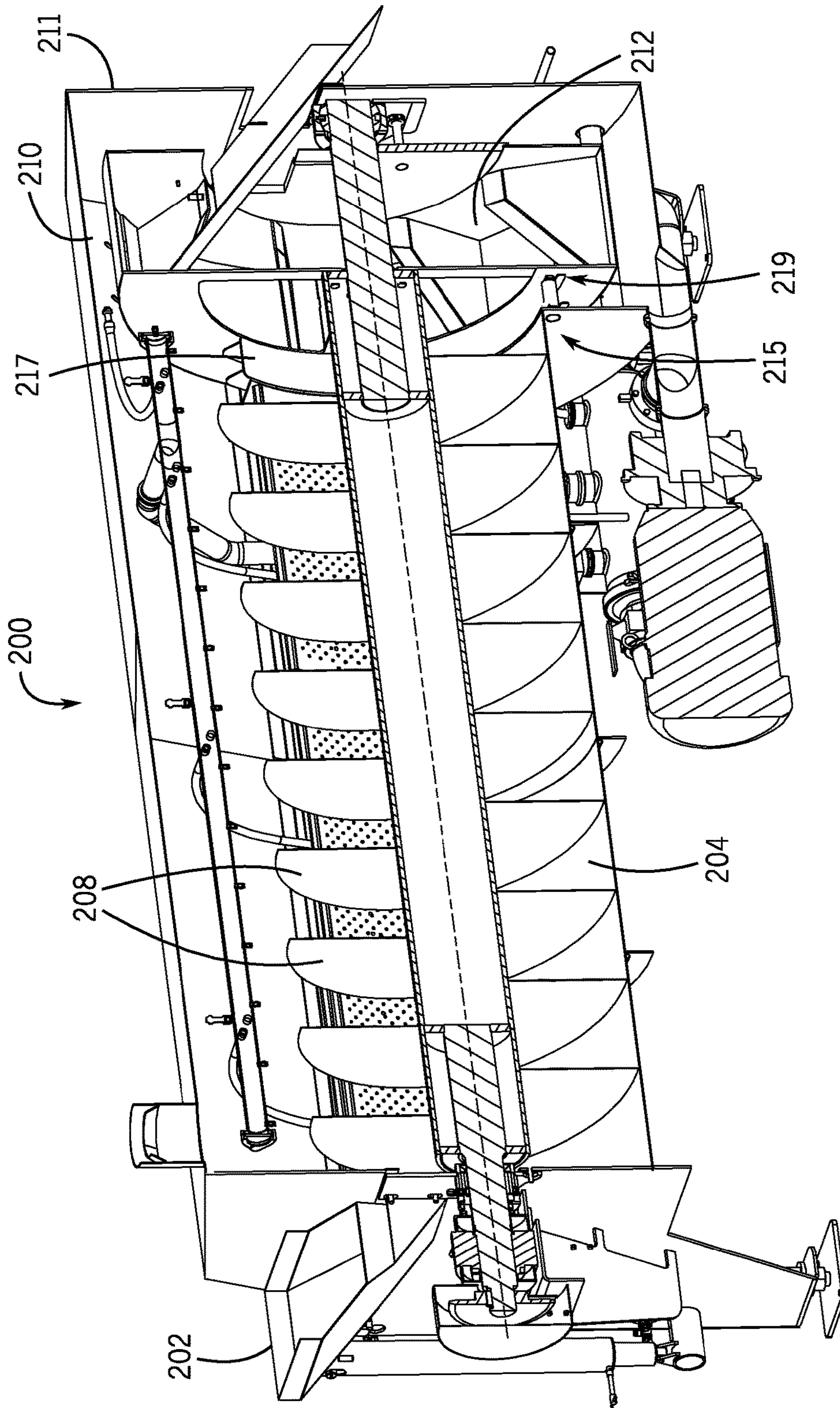


FIG. 3

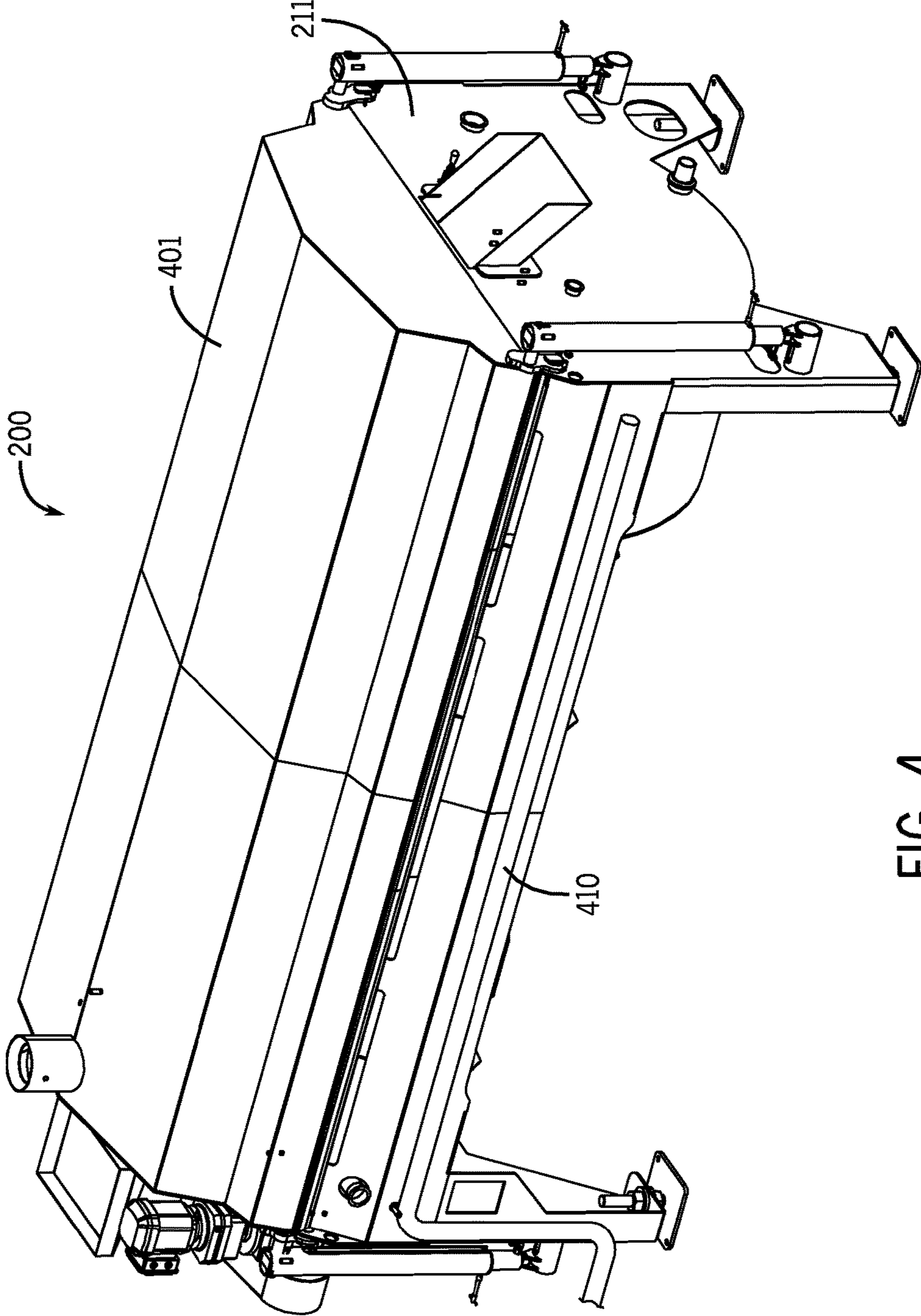


FIG. 4

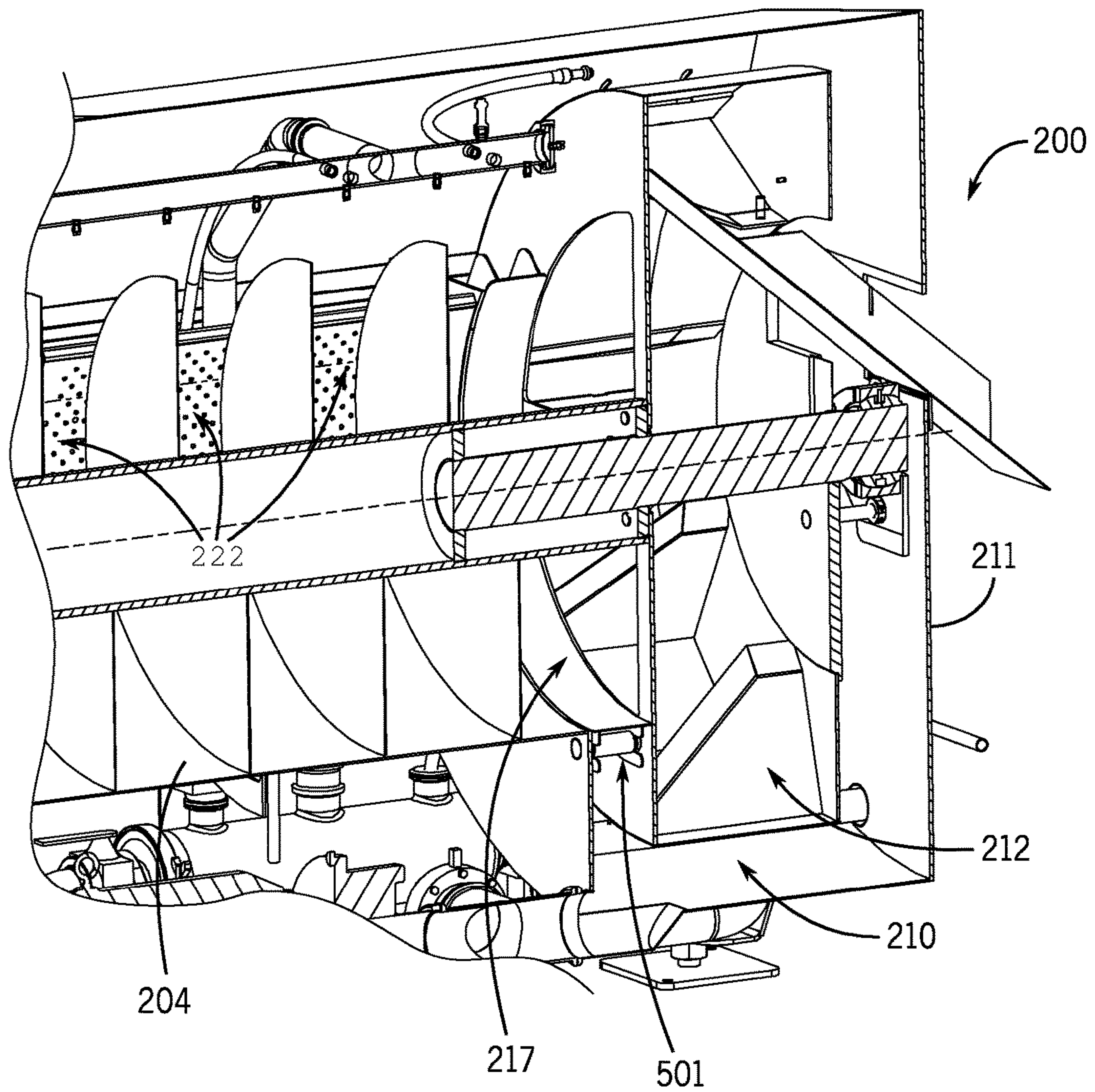


FIG. 5

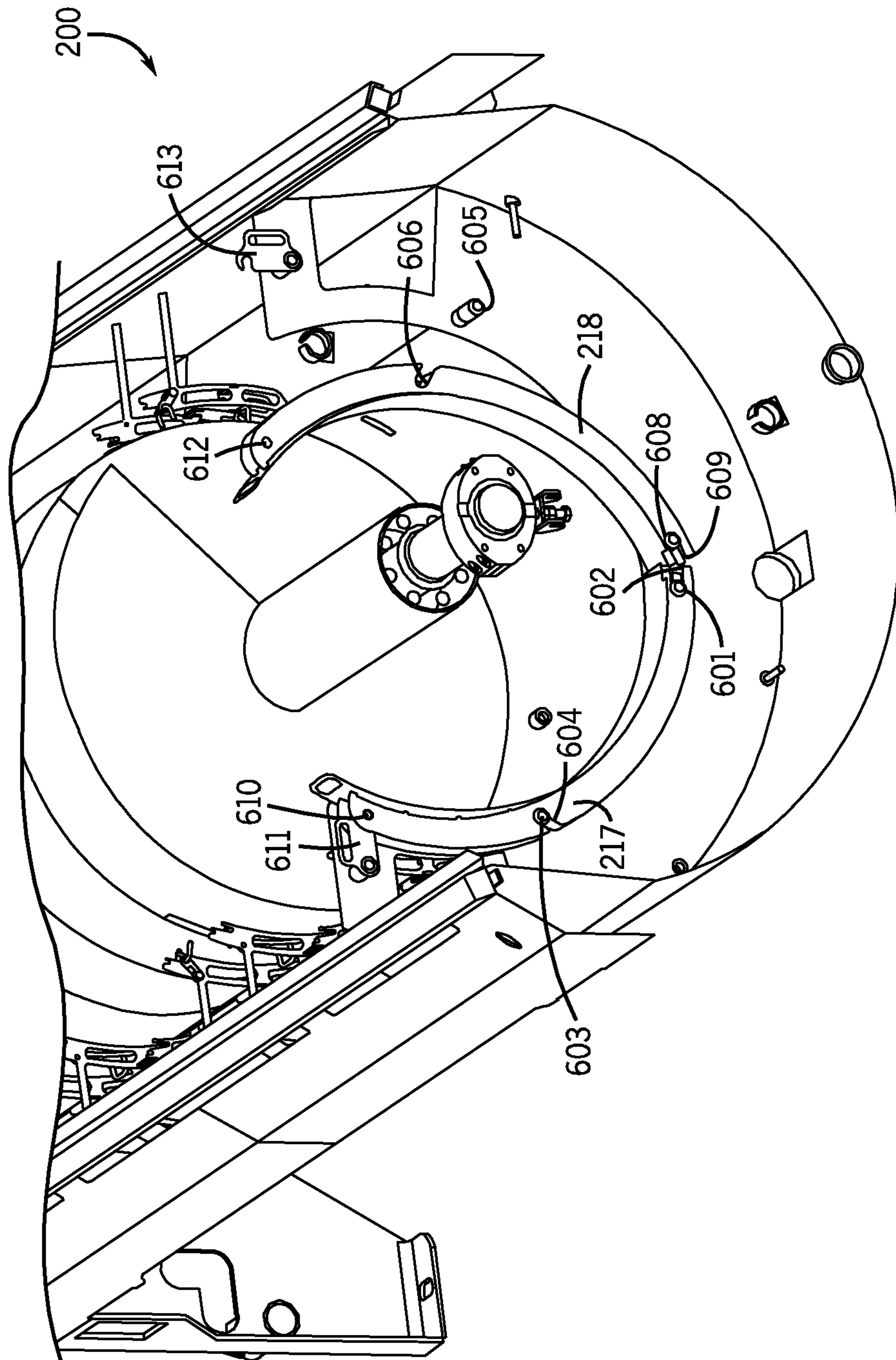


FIG. 6

ROTARY SCREW BLANCHER

FIELD OF THE INVENTION

The present invention relates to blanchers and, more particularly to rotary screw blanchers with a passage for fluid and/or with fluid agitation.

BACKGROUND OF THE INVENTION

In mass processing of food product, food product is often heated by cooking or blanching the food product in a food processing apparatus having a tank holding a heat transfer medium into which the food product is immersed. After cooking or blanching of the food product occurs, the food product may be cooled or chilled by immersing the food product in a cool transfer medium so that the food product may be packaged, stored and/or shipped. In some known systems, a rotary drum blancher or a rotary screw blancher is used to first cook or blanch the food product, and the food product is discharged onto a belt or other type of conveyor and advanced to a rotary cooler to reduce the food product temperature to an acceptable temperature. In another known system, a single compact apparatus (e.g., a combination cooker-cooler) is used to heat and cool the food product in continuous flow.

In a rotary drum blancher, food product is introduced into an inlet end of an elongate drum, which is rotatably mounted in a generally cylindrical, open-top tank. The tank is fitted with a cover for minimizing heat loss and for enclosing the drum for safety reasons, and which can be opened for maintenance and cleaning. The drum includes an auger therein for advancing food product from the inlet end of the drum to an outlet end of the drum and through the heat transfer medium. The drum includes a structural frame with perforated skin panels that are typically bolted on or can be partially or fully removable from the drum.

In a rotary screw blancher, food product is introduced into an inlet end of a generally cylindrical, open-top tank. A rotatable auger is mounted within the tank for advancing food product from the inlet end to an outlet end of the tank and through a heat transfer medium. The tank is fitted with a cover for minimizing heat loss and for enclosing the auger for safety reasons, and which can be opened for maintenance and cleaning.

The rotary blancher is generally used to cook a variety of food products, including pasta, rice, vegetables, dry beans, pouched meat, pouched sauces, etc. Cleanliness is a concern in the food processing industry, and strict hygienic standards and inspections are observed throughout the industry for machinery that comes in contact with food for human consumption. Many facilities will process small batches of a variety of products in a single day or shift, which requires cleaning of the rotary blancher, and in particular the drum, between product runs. It is necessary for rotary blanchers to provide access for cleaning sprays to all joints and cavities within the drum where contaminant accumulation may occur. In some rotary drum blanchers, it is necessary to remove perforated skin panels from the drum frame or reposition access doors of the drum to perform the necessary cleaning. Such actions require high levels of labor and machine down time.

One solution is use of a rotary screw blancher, which is easier to clean because the rotary screw blancher lacks a drum and has higher food product capacity than similarly sized rotary drum blanchers because food product can run at deeper depths. However, the auger causes more damage to

food product as compared to rotary drum blanchers, especially if food product is caught in clearance gaps between the auger and the tank.

Some prior art rotary screw blanchers include an inner screen with a very small clearance between the auger and the screen to reduce damage to product. The screen also allows water flow from one auger flight to the tank surrounding the screen, and thus to another flight. One example of such a prior art rotary screw blancher may be found in U.S. Pat. No. 7,735,415, hereby incorporated by reference. The rotary blancher described therein includes the ability to move the screen from a first position for using the blancher, to a second position for cleaning the blancher.

Another rotary screw blancher is described in US Patent Application Publication 20110072980, hereby incorporated by reference, and includes an auger with close clearance to a solid imperforate tank. A screen panel with side channels is provided to allow water flow between the auger flights. The screen panels are moveable (or removable) to allow cleaning behind the screens.

Prior art rotary screw blanchers have included several discharge mechanisms, including a ferris wheel style (shown in U.S. Pat. No. 7,735,415) and a plenum style (shown in application publication 20110072980 and in U.S. Pat. No. 8,006,613, hereby incorporated by reference).

One need of the prior art is the ability to transition from the auger portion of the blancher to the discharge portion, and to provide easy cleaning of the transition zone. If this distance is short, there is less likelihood of product falling outside the area intended to contain the product, but this puts several large plates of sheet metal close together, and this is difficult to clean. If the transition is extended, then cleaning of the large plates becomes easier, but there is a hidden surface on the underneath side of this transition that requires access doors to visually inspect, or mirrors or other devices are required. Cleaning of this area has been a concern for food processing companies that process Ready to Eat meals (RTE's) or companies with high sanitation requirements. A close transition is desirable to allow the product to move from the main tank to the discharge section of the tank.

SUMMARY OF THE PRESENT INVENTION

According to a first aspect of the invention a food processing apparatus is a rotary screw blancher with a tank having an inlet end for receiving food product and an outlet end for discharging food product. The tank has a rotatable auger mounted in a compartment that advances food product from the inlet end toward the outlet end. The auger includes flights having a flight wall with a radial edge. A clearance space is between the radial edge of the flights and the compartment wall. One of the inner wall and the flight wall may include a perforated wall portion to allow for fluid flow between flights. A transition zone between the auger and the outlet end includes a moveable surface to contain food product while in use.

The inner wall and/or flights are at least partially perforated whereby fluid can flow between flights in some alternatives.

The inner wall includes a portion that moves between an operating position for maintaining the food product in the compartment, and a cleaning position to allow access for cleaning the compartment in other alternatives.

The outlet end has a discharge chute and/or a plenum discharge and/or a ferris wheel to remove food product, and/or the inlet end has a chute and/or a flume to receive food product in other alternatives.

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A source heated water provides heated water to the compartment in other alternatives.

A cooler, that may have a source of chilled water, receives food product from the transition in other alternatives.

A moveable cover is attached to the tank in other alternatives.

A manifold, within or outside of the tank, is disposed to provide water to the compartment, and/or does so using nozzles, in other alternatives.

The transition covers an arc of at least 180 or 240 degrees and/or extends from beneath the fluid level to above the fluid level in various alternatives.

The transition is comprised of two portions, that can be mirror images of one another, and a support bar can support each portion when the transition is in the operating position in various alternatives.

The transition forms a portion of a circumference of a circle, and when the transition is moved from the operating position to the cleaning position it follows a path that further defines the circumference of the circle in various alternatives.

A restraint engages the transition to hold it in the cleaning position in various alternatives.

A clamping mechanism, partially affixed to the transition, clamps the transition in place in various embodiments.

The cleaning position is in a fixed position, not a fixed position, in the tank, or outside of the tank in various embodiments.

Other principal features and advantages of the invention will become apparent to those skilled in the art upon review of the following drawings, the detailed description and the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is prior art blancher;

FIG. 2 is a cross sectional view of a blancher in accordance with the present invention;

FIG. 3 is a perspective cross sectional view of a blancher in accordance with the present invention;

FIG. 4 is a perspective view of a blancher in accordance with the present invention with a cover;

FIG. 5 is diagram of the transition area of a blancher in accordance with the preferred embodiment; and

FIG. 6 is a diagram of the transition area showing a clamping mechanism in accordance with the preferred embodiment.

Before explaining at least one embodiment of the invention in detail it is to be understood that the invention is not limited in its application to the details of construction and the arrangement of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments or of being practiced or carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting. Like reference numerals are used to indicate like components.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

While the present invention will be illustrated with reference to a particular blancher and discharge, it should be understood at the outset that the invention can be implemented with other blanchers, coolers, cookers and discharges.

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This invention generally includes a screw conveyor within a tank that has water injection inside the tank area, and a movable screen wall within that tank that allows passage of water easily between the flights of the auger, and/or to the discharge area. This allows for easy water balance within the whole tank and does not cause irregular water levels within individual flights. In addition, there is a movable transition between the main tank and the ferris wheel tank area that allows cleaning access to all surfaces without hidden or shaded areas that would prevent visible inspection of all surfaces. The mechanism for moving the transition can be similar to the movable screens in the main tank area. As used herein, the tank can be the structure holding the water, and the tank can include a drum, can be without a drum, or a drum can be the tank.

The invention will be described initially with respect to the rotary screw blancher described in US Patent App. Publ. 20110072980. The blancher includes a rotary auger with a number of flights. The tolerance between the auger flights and the compartment containing the auger is tight. FIG. 1 shows a prior art rotary screw blancher **20** for use in a food processing system. The blancher **20**, or cooker, uses a heat transfer medium to cook food product that advances through the blancher **20**. In other constructions, the blancher **20** may be used for other food processing operations, such as, for example, cooling food product. Features of the blancher **20** may be similar to the blancher shown and described in U.S. Pat. No. 7,735,415.

The tank **24** is supported by a frame having legs that rest upon a support surface and space the tank **24** above the support surface. The tank **24** is preferably made of stainless steel or another suitable material for food processing applications. The tank **24** defines, in part, an inner compartment **50** which, in the illustrated construction, is divided into a blanching compartment **52** and a dewatering compartment **54**. In other constructions, the inner compartment **50** may include a single compartment or may be divided into more than two compartments.

Tank **24** includes an inlet end wall **60** at the inlet end **32** of the tank **24**, an intermediate wall **62** and an outlet end wall **64** at the outlet end **40** of the tank **24**. Each end wall **60**, **64** defines an opening **68** (the opening in the outlet end wall **64** is shown in FIG. 1) that communicates with the inner compartment **50** of the tank **24**. The infeed flume or chute passes through the opening **68** in the inlet end wall **60** and a discharge chute **36** (or a discharge chute) passes through the opening **68** in the outlet end wall **64**.

The intermediate wall **62** divides the inner compartment **50** into the blanching compartment **52** and the dewatering compartment **54**. The intermediate wall **62** also defines an opening **68** communicating between the blanching compartment **52** and the dewatering compartment **54**. Other configurations of the walls, openings and chutes and/or flumes may be utilized in other constructions of the blancher **20**. The preferred embodiment uses a ferris wheel-type discharge, with dewatering compartment **52** being smaller, and does not utilize intermediate wall **62**.

A cover is generally attached to the tank **24** in such a manner as to allow the cover to move relative to the tank **24** and permit access to the inner compartment **50**. In the one construction, lift cylinders (not shown) may extend between the tank **24** and the cover to lift the cover relative to the tank **24** and permit access to the tank **24** and the inner compartment **50**. In another construction, the cover may be hingedly connected to the tank **24** so the cover can be swung away from the tank **24** to permit access to the tank **24** and the inner compartment **50**.

An auger **88**, or helical screw, is disposed within the blanching compartment **52** and rotates to advance food product from the inlet end **32** of the tank **24** toward the outlet end **40** of the tank **24**. The auger **88** includes a shaft **92** that extends along an axis **94** between the inlet end wall **60** and the intermediate wall **62** of the tank **24**. To support the auger **88**, a first end **96** of the shaft **92** is rotatably supported by the inlet end wall **60**, and a second end **100** of the shaft **92** is rotatably supported by the intermediate wall **62**.

The auger **88** includes a plurality of axially spaced apart and interconnected flights **104** that spiral substantially the length of the blanching compartment **52**. Generally, the flights **104** define auger sections **106** therebetween. As the auger **88** rotates, the flights **104** move food product from the inlet end **32** of the tank **24** to the intermediate wall **62** of the tank **24** and through the sections **106** of the auger **88**. The blancher **20** includes a drive assembly interconnected with the auger shaft and a main drive motor which drives rotation of the auger **88**. The tank **24** and the auger **88** are configured and adapted to maintain a tight tolerance between the two. For example, a clearance gap between the inner wall **44** and the radial edge of the auger flights **104** may be between about 0.03 inches and about 0.25 inches and, in some constructions, between about 0.05 inches and 0.15 inches. In the illustrated construction, the clearance gap is about 0.12 inches. The tight tolerance between the tank **24** and the auger **88** reduces damage to food product passing through the blanching compartment **52**, because the small clearance gap prevents even small size food product, such as rice, beans, noodles, etc., from becoming stuck between the inner wall **44** and the auger **88**. Generally, as long as the food product to be processed is larger than the clearance gap, damage to the food product passing through the blanching compartment **52** will be reduced. Further, the clearance gap is sufficient to prevent metal-to-metal contact between the tank **24** and the auger **88**, as the auger **88** rotates, which could introduce contaminant metal particles into the food product.

As mentioned above, in the illustrated construction, the inner wall **44** has a solid, imperforate wall portion **46** and a perforated wall portion **48**. The tank **24** also has an outwardly-extending second wall portion **116** generally connected to the solid, imperforate wall portion **46**. The perforated wall portion **48** is positioned such that a passage **120** is defined between the perforated wall portion **48** and the second wall portion **116**. The passage **120** extends in a direction of the inlet end **32** and the outlet end **40** and spans at least two auger sections **106**. In the illustrated construction, the passage **120** extends from the inlet end **32** to the outlet end **40**. In the illustrated construction, the tank **24** includes a passage **120** (and a second wall portion **116** and a perforated wall portion **48**) on each lateral side. Generally, at least a portion of the perforated wall portion **48** and the passage **120** is below the fluid level. Flow of fluid is thus provided through the perforated wall portion **48** and into and along the passage **120** to generally balance the fluid level **F** in the blanching compartment **52** and between the auger sections **106**. At the same time, the shield-like perforated wall portion **48** helps contain the food product in a given auger section **106** and prevent migration of the food product between auger sections **106**.

A manifold **150** is positioned in the tank **24** above the axis **94** of the auger **88** and beyond the radial edge of the flights **104** of the auger **88**. Alternatives provide that the manifold be outside the tank. The manifold **150** is positioned below the height of the auger **88**. In the illustrated construction, the manifold **150** is the positioned closer to one opposite side (e.g., the left side when viewed from the inlet end **32**) of the

inner wall **44** and is configured to inject fluid (see arrow **A** in FIG. 2) downwardly along one opposite side of the inner wall **44** and into the blanching compartment **52**. The injected fluid generally follows the curve of the inner wall **44** to induce a swirling flow in the blanching compartment **52**. In other constructions (not shown), the manifold **150** may be positioned on the opposite side (e.g., the right side), or a manifold **150** may be positioned on each side of the tank **24**. Alternatives provide for having the manifold below the axis, outside of the tank, not using a movable screen wall and/or not using water injection.

The manifold **150** includes a plurality of injectors or agitators **221**, directed into the blanching compartment **52**. Directed flows, jets or streams of fluid are discharged from injectors or nozzles **221** into the blanching compartment **52**. Fluid is discharged from the injectors **172** with sufficient force to pass through the perforated wall portion **48** and displace the food product. The discharged fluid may displace food product in the blanching compartment **52**, keep the food product off the inner wall **44** of the tank **24**, breaks up clumps of food product, protect the food product from damage, reduce temperature variation in the food product, help increase heat transfer, etc. One example of suitable injectors is described in U.S. Pat. Nos. 6,214,400 and 6,234,066, the entire contents of which are hereby incorporated by reference. Another embodiment provides that the nozzles **221** are located to direct water along and down the interior of wall portion **48**.

Uncooked food product is inserted into the blancher **20** through the inlet end **32** of the tank **24**. The auger **88** is rotated to move the uncooked food product through the hot heat transfer medium in the blanching compartment **52**. As the food product moves through the heat transfer medium, the food product becomes cooked.

In some construction, the blancher **20** could be used in a combination cooker-cooler. In such a construction, the blancher **20** can provide the cooker portion, and the transfer mechanism **190** can transfer the food product from the cooker portion to the cooler portion. Another transfer mechanism, which may be similar to the transfer mechanism **190**, may be provided to transfer food product from the cooler portion.

Turning now to FIG. 2, a cross section of a blancher **200** constructed in accordance with the preferred embodiment is shown. This particular embodiment does not include an intermediate wall, and uses a ferris wheel discharge. Blancher **200** includes an inlet **202**, a compartment **204**, an auger **206** within compartment **204** and having radial flights **208**, and an dewatering section or outlet end **210**, near end wall **211**. Outlet end **210** includes a ferris wheel discharge **212**. Discharge **212** could be another type of discharge, such as a plenum discharge.

A transition area **215** is disposed between compartment **204** and outlet end **210**. It may be seen that in this embodiment the diameter of compartment **204** is less than the diameter of outlet end **210**, and a transition **217** spans the transition area **215**. Transition **217** prevents food product from collecting in area **219** because transition **217** effectively extends compartment **204** into outlet end **210**.

The perspective view of FIG. 3 shows transition **217** extends from the bottom (6:00 position) upward about 120 degrees (10:00 position). Alternatives provide for the transition to extend 90 or 150 degrees, or from below the fluid water to above the fluid level. There are preferably two transitions **217**, the other being a mirror image of that shown. The transition is moveable, from the position shown to a cleaning position, and is preferably an arcuate stainless

steel metal transition all that moves between the position shown where the lower ends are close or abutting, and a cleaning position where the upper ends are close or abutting. The in-use position provides that the transitions form a transition zone within which food product continues to move toward the discharge without dropping into area **219**, effectively forming an extension of compartment **204**. Transition **217** preferably extends upward about as far as moveable metal screens **221** extend.

When transition **217** is moved into the clean position, the area **219** is accessible for cleaning.

A perspective view of blancher **200** with a cover **401** in the closed position is shown in FIG. **4**. Manifold **410** is mounted to the blancher and supplies water to the nozzles.

Turning now to FIG. **5**, transition **217** extends from a support-index bar **501** for about 120 degrees. Support-index bar **501** hold transition **217** (and its mirror image corresponding transition, collectively called a transition pair) in the proper position, and, if needed, can complete any gap between the transition pair. Support **501** can include slots for each transition **217**, or otherwise lock transitions **217** into place. They are moveable when unlocked, as the screen are moveable, to the cleaning position (preferably abutting at the 12:00 position), and are similarly held in position at that location, or are held by a brake, clamp or other restraint. The lock and or brake/restraint are omitted in alternative embodiments. Transitions **217** may be mounted to move with screens **222**, or can include a separate mechanism such as a track for moving. Preferably the mechanism causes transitions **217** to move in an arc shape path forming the circumference of a circle.

The embodiment shown in FIG. **6** provides that transition **217** and transition **218** are pivotable and removable rather than rotating to a new position on a track. Here, the cleaning position can be entirely removed, or left in the tank for cleaning. FIG. **6** shows transition **217** in the operating position, and transition **218** partially in the operating position. Transition **217** includes slots **602** and **604**, and pin **610**. Pins **601** and **603**, and a moveable hook **611** are affixed to blancher **200**. Slot **602** receives pin **601**, slot **604** receives pin **603** and hook **611** is lowered over pin **610**, holding transition **217** in place. A clamp can hold hook **611** in the engaged position. Pins **601**, **603**, **610**, hook **611** and slots **602** and **604** are collectively referred to as a clamping mechanism, because they cooperate to clamp transition **217** in place. A portion of the clamping mechanism is affixed to blancher **200** and a portion of the clamping mechanism is affixed to transition **217**.

Transition **218** is identical to transition **217**, with slots **609** and **606**, and pin **612**. A pin **608**, affixed to blancher **200**, is beginning to be received by slot **609**. A pin **605**, on blancher **200**, will be received by slot **606** when transition **218** is fully in the operating position. Pin **612** will be engaged by a hook **613**, attached to blancher **200**, when transition **218** is fully in the operating position, and when hook **613** is rotated downward. A clamp can hold hook **613** in the engaged position. Pins **608**, **605**, **612**, hook **613** and slots **609** and **606** are also a clamping mechanism, because they cooperate to clamp transition **218** in place.

Numerous modifications may be made to the present invention which still fall within the intended scope hereof. Thus, it should be apparent that there has been provided in accordance with the present invention a rotary screw blancher that fully satisfies the objectives and advantages set forth above. Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is

intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A food processing apparatus comprising:

a tank having an inlet end for receiving food product and an outlet end for discharging the food product, the tank having an inner wall defining a compartment and including a solid, imperforate wall portion, fluid being contained in the compartment;

a rotatable auger mounted in the compartment along a longitudinal axis of the compartment, the rotatable auger for advancing the food product within the compartment from the inlet end toward the outlet end, the rotatable auger including flights having a flight wall on a rotational shaft of the rotatable auger with a radial edge on the flight wall, the flight wall separating a first auger section from a second auger section;

wherein the outlet end includes a discharge mechanism, and further includes a moveable transition that includes at least one of a slot, a pin, a hook, and a clamp, and that extends toward the outlet end from the rotatable auger in a direction the food product advances, and wherein the moveable transition does not extend beyond a beginning of the discharge mechanism, and wherein the moveable transition has a first operating position for maintaining the food product in a desired product transfer area and a second cleaning position to allow access to a cleaning area, and wherein the moveable transition is held in the first operating position by the at least one of the slot, the pin, the hook, and the clamp, and wherein the at least one of the slot, the pin, the hook, and the clamp is partially affixed to the moveable transition.

2. The food processing apparatus of claim 1, wherein at least one of the inner wall and the flights are at least partially perforated whereby the fluid can flow between the flights.

3. The food processing apparatus of claim 2, wherein the inner wall includes a first moveable portion having a compartment operating position for maintaining the food product in the compartment and a compartment cleaning position to allow access for cleaning the compartment.

4. The food processing apparatus of claim 1, wherein the discharge mechanism comprises at least one of a discharge chute, a plenum discharge, and a ferris wheel, disposed to receive the food product from the moveable transition.

5. The food processing apparatus of claim 1, further comprising a source of heated water disposed to provide heated water to the compartment.

6. The food processing apparatus of claim 5, further comprising a cooler disposed to receive the food product from the moveable transition.

7. The food processing apparatus of claim 1, further comprising a source of chilled water disposed to provide chilled water to the compartment.

8. The food processing apparatus of claim 1, wherein the inlet end includes at least one of a chute and a flume extending into the compartment.

9. The food processing apparatus of claim 1, further comprising a moveable cover attached to the tank.

10. The food processing apparatus of claim 1, further comprising a manifold disposed to provide water to the compartment.

11. The food processing apparatus of claim 10, wherein the manifold is disposed outside of the tank, and nozzles connected to the manifold inject the water into the compartment.

12. The food processing apparatus of claim 10, wherein the manifold is disposed inside of the tank, and nozzles connected to the manifold inject the water into the compartment.

13. The food processing apparatus of claim 1, wherein the moveable transition covers an arc of at least 240 degrees.

14. The food processing apparatus of claim 1, wherein the moveable transition covers an arc of at least 180 degrees.

15. The food processing apparatus of claim 1, wherein the fluid is disposed in the tank, and the moveable transition extends from beneath a fluid level to above the fluid level.

16. The food processing apparatus of claim 1, wherein the moveable transition forms a portion of a circumference of a circle, and wherein when the moveable transition is moved from the first operating position to the second cleaning position it follows a path that further defines the circumference of the circle.

17. The food processing apparatus of claim 1, further comprising a restraint that engages the moveable transition to hold the moveable transition in the second cleaning position.

18. The food processing apparatus of claim 1, wherein the second cleaning position is a fixed position attached to the tank.

19. The food processing apparatus of claim 1, wherein the second cleaning position is outside of the tank.

20. A food processing apparatus comprising:

a tank having an inlet end for receiving food product and an outlet end for discharging the food product, the tank having an inner wall defining a compartment and

including a solid, imperforate wall portion, fluid being contained in the compartment;

a rotatable auger mounted in the compartment along a longitudinal axis of the compartment, the rotatable auger for advancing the food product within the compartment from the inlet end toward the outlet end, the rotatable auger including flights having a flight wall on a rotational shaft of the rotatable auger with a radial edge on the flight wall, the flight wall separating a first auger section from a second auger section; and

wherein the outlet end includes a discharge mechanism, and further includes a moveable transition that extends toward the outlet end from the rotatable auger in the direction the food product advances, and wherein the moveable transition does not extend beyond the beginning of the discharge mechanism, and wherein the moveable transition has a first operating position for maintaining the food product in a desired product transfer area and a second cleaning position to allow access to a cleaning area;

wherein the moveable transition includes at least one of a slot, a pin, a hook, and a clamp and is comprised of two arcuate metal portions, and a support bar that supports each of the two arcuate metal portions when the moveable transition is in the first operating position.

21. The food processing apparatus of claim 20, wherein the two arcuate metal portions are each a mirror image of the other.

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